

Name_____

Show your work!

- 1) Given the following set of numbers:

$$X = \{7.1, 1.8, 2.1, 1.5, 2.1\}$$

- a) Find the median, mean and standard deviation. State the formulas (or procedure) for these values, plug the numbers into the formula, and evaluate the results. You may use your calculator's automated functions to verify your answers. (8 points)
- b) Compare the mean and median. Which is more resistant to outliers? (2 points)

- 2) In the “March Madness” tournament of basketball there are 64 teams that begin the tournament. After each game one team is eliminated.
- a) If the outcome of the tournament were completely random, what would be the probability of being in the final four (6 points)?
- b) What is the probability of NOT being in the final four (4 points)?

- 3) Joe wants to do a study to see whether having tattoos is related to having Hep C among people at San Quentin. To figure this out, he decides to test everyone coming through reception during the month of March for Hep C and also identifies whether these people have tattoos.

Joe finds no association between being positive for Hep C and having a tattoo. Based on this finding, Joe concludes that among people at San Quentin, getting a tattoo doesn't make someone more likely to get Hep C.

- a) What type of study design is this (4 points)?
- b) Joe makes a causal claim. Why doesn't his study support this? (6 points)

- 4) Explain the following:

- a) What is the placebo effect? Why is it important to randomize in clinical studies? (3 points)
- b) What happens to the standard deviation of the sample mean as the sample size gets larger (2 points)?

5) In past studies, it has been found that the distribution of weights for a certain population of young men ages 21 to 29 is normal with mean 180 pounds and standard deviation 25 pounds.

a. Given these facts, what proportion of this population weighs more than 200 pounds (5 points)?

b. You are planning to take a simple random sample of 100 men from this population. What is the shape of the distribution of \bar{x} ? What is the mean of \bar{x} ? What is the standard deviation of \bar{x} (5 points)?

c. What is the probability that \bar{x} is greater than 200 pounds (5 points)?

d. **[EXTRA CREDIT]** If your sample \bar{x} turns out to be 210 pounds, what would you conclude about the population mean? Do you think the population mean could really be 180 pounds (5 points)?

- 6) In city Y the average hourly income for a waiter is \$23.90 with a standard deviation of \$4.30. In city Z the average hourly income for a waiter is \$21.50 with a standard deviation of \$2.20. George waits tables in city Y and makes \$25.30 per hour. Sam waits tables in city Z and makes \$22.50 per hour.

Assume the distribution of income is a normally distributed.

Which waiter is making a higher income relative to the average in their city (10 points)?

Hint: How do you compare the values of two random variables with different means and standard deviations?

- 7) There are three main shipping ports in California where large ocean going vessels load and unload shipping containers: Oakland, Long Beach and Los Angeles. These shipyards are managed independently, have different clients and experienced no major disruptions in the year of interest. Therefore, it is reasonable to assume that container loading and unloading at the ports are independent.

	Port of Los Angeles	Port of Long Beach	Port of Oakland
Mean number of containers loaded or unloaded per day in 2008	21,700	20,100	6,400
Standard deviation of containers loaded or unloaded per day in 2008	6,500	4,000	900

Find the mean and standard deviation of the number of shipping containers loaded or unloaded at California's three major ports each day in 2008 (10 points).